**The Discovery and Exploration of the Wolperdinger**

**Part II Elaboration Activity: Genes, Meiosis and Phenotype**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
Partners: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

We’ve now spent a lot of time learning about chromosome movement and Meiosis, but what does this have to do with Wolperdingers and how they look? Let’s look at just one aspect of Wolperdinger looks - fur color. Wolperdingers have either brown or gray hair and it can be either wavy or straight. The gene for fur color is on the big chromosome and the gene for fur type is on the small chromosome. There are two **alleles** (which are expressions of a gene) for each. Brown fur (B) is dominant over gray (b) and straight fur (S) is dominant over wavy (s). We are going to locate these alleles on our chromosome models to see what happens to them during Meiosis.

1. Use tape to put your chromosomes back together just as they were when you drew them in Part I (a normal Wolperdinger cell). Make sure to fold the chromosomes so that only one chromatid is showing.
2. The Wolperdinger fur color gene is on the large chromatid. Our Wolperdinger got an allele for brown fur color from its mother and an allele for gray fur color from its father. Write these alleles ***on the same location*** on the chromatids.
3. The Wolperdinger fur type gene is on the small chromatid. Our Wolperdinger got an allele for straight hair from its mother and an allele for wavy hair from its father. Write these alleles ***on the same location*** on the chromatids. Be sure your S’s can be distinguished from your s’s.
4. Remember that before any cell division can take place the DNA making up the chromatid must be copied. Represent this by unfolding your chromatids to make a chromosome. Since the two chromatids are exact copies, you should know which alleles are on the new copies. Write those letters on the new copies.
5. Now go through the steps of Meiosis.

***QUESTIONS***

1. What alleles does our Wolperdinger have for fur (what is its genotype?). What does its fur look like?
2. What combinations of alleles did you have in your Wolperdinger gametes after Meiosis was finished?
3. Can you use Meiosis to get other combinations of alleles in the Wolperdinger gametes? What other combinations are possible? All these combinations of alleles are the possible combinations that could wind up in the sperm or egg of a Wolperdinger.
4. Now your Wolperdinger is ready to mate! Pick one of your gametes to use to mate with the Wolperdinger of another group. The other group should pick one of their gametes to use in the mating with your Wolperdinger. Put the chromosomes together - what combination of alleles did you create for your new baby Wolperdinger?
5. Look to see if there are other combinations of alleles that you could make if you used different gametes for the mating.
6. A Punnett square helps to show geneticists the possible combinations of alleles that are possible from the mating. The possible combinations of alleles from one parent are listed across the top, and the possible combinations of alleles from the other parent are listed across the bottom. Since in your mating of Wolperdingers both parents are BbSs, complete the following Punnett Square for (BbSs x BbSs)

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# \*Adapted from “The Chromosomes of a Frimpanzee”

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